

# NEERU NARANG

## Education

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M.S. Electrical Engineering West Virginia University, Morgantown, WV	August 2009-Present GPA: 3.4/4.0
M.S. Instrumentation Panjab University, India	August 2006-August 2008 GRADE: A
M.S. Physics Panjab University, India	August 2003-August 2006 GRADE: A
B.S. (Physics, Mathematics) Panjab University, India	August 2000-August 2003 GRADE: A

## Professional Experience

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**Graduate Research Assistant (Multispectral Imagery Lab) August 2009-Present**

### **Design and Development of Multi-Wavelength Face Acquisition System:**

- Developed the multi-wavelength face acquisition system in Short Wavelength Infrared (SWIR) band for multispectral imagery lab.
- Empirical optimization of the main settings of Single Sensor Multi-Wavelength (SSMW) acquisition system that operates in the SWIR band was performed using image quality assessment methods and spectral analysis techniques to obtain the best quality images and to improve the performance of face recognition system.

This work was supported by the Office of Naval Research (ONR), U.S.A.

### **Classification of Frontal and Non-Frontal Face Images based on Quality Scores:**

- Developed algorithms for the classification of multi-wavelength images for SSMW system in terms of the individual wavelength across the infrared band using quality based score level fusion scheme methods and statistical classifiers.
- Developed algorithms to classify the face images as frontal and non-frontal based on weighted quality based score level fusion scheme.

### **Face Detection for Multi-Wavelength Face Acquisition System:**

A face detection algorithm is developed to detect the face images using image quality analysis methods. Project involved night time identification in heterogeneous environments and faces are detected for database collected under fully controlled, semi-controlled and uncontrolled environment conditions.

This work was funded by the Office of Naval Research (ONR), U.S.A.

### **Database Collection for Multispectral Imagery Lab:**

Experienced in data collection for biometric research in multispectral imagery lab using visible, SWIR and thermal cameras in fully controlled, semi-controlled and uncontrolled environment conditions.

## Publications

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T. Bourlai, **N. Narang**, B. Cukic and L. Hornak, "SWIR Multi-Wavelength Acquisition System for Simultaneous Capture of Face Images", SPIE (Vol. 8353), Infrared Technology and Applications XXXVIII, Baltimore, U.S.A., Apr. 2012.

J. Ice, **N. Narang**, C. Whitelam, N. Kalka, L. Hornak, J. Dawson, and T. Bourlai, "SWIR Imaging for Facial Image Capture through Tinted Materials", SPIE (Vol. 8353), Infrared Technology and Applications XXXVIII, Baltimore, U.S.A., Apr. 2012.

**N. Narang**, T. Bourlai, "Face Recognition in the SWIR Band using Single Sensor Multi-wavelength Imaging Systems", IEEE Transactions on Information Forensic & Security. (*Submitted*)

## Academic Projects

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### **Image Processing (Batch Image Processing Toolbox)**

The goal of this project was to perform image processing tasks including; sharpening, smoothing, deblurring, feature extraction, segmentation and file management tasks including renaming/copying.

### **Tracking of Moving Objects (Face Feature Tracking)**

The goal of the project was to select features that are best suited for object tracking and to verify that features are trackable and eventually to identify the features from frame to frame.

### **Identification (RFID Based Surveillance System)**

The goal of this project was to develop a radio frequency based surveillance system. This system was capable of identifying the RFID tag holder by communicating between RFID reader and tag.

## Research Skills

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- Proficient in MATLAB programming including knowledge of image processing, computer vision and statistical pattern recognition toolboxes.
- Experienced in multispectral imaging across visible and SWIR band including data acquisition, optimization of experimental set-up, classification and recognition of objects using image quality analysis and machine learning methods .

## Technical Skills

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Programming Languages	: Matlab, Python, C++, Fortran, Labview, Latex
Assembly Languages	: Intel 8085, 8086, 8051
Data Analysis & Graphing Software	: OriginLab, GIMP
Operating Systems	: Unix, Linux, Windows, Mac OS X